

App'l. No. : Unknown
Filed : Herewith

10/030413
3 Rec'd PCT/PTO 21 DEC 2001

IN THE SPECIFICATION:

Please amend the specification as follows:

TOOL FOR CHANGING THE DRILLING DIRECTION WHILE DRILLING

Related Applications

This application claims the benefit of the Norwegian application 19993138 filed June 24, 1999 and the international application PCT/NO00/00213 filed June 21, 2000.

Background of the Invention

Field of the Invention

The invention relates to adapted for changing the drilling direction while drilling with drilling equipment, which preferably comprises a drill string, such as coiled tubing, a bent sub, drilling motor and drill bit.

Description of the Related Art

During directional drilling of a formation in the ground, e.g. in horizontal drilling of a well, it is common to use drilling equipment, which comprises a drill string, bent sub and drill bit. The drill string may be formed of coiled tubing, and the drill bit may be hydraulically driven by the fluid circulating in the drill string. The drilling direction is changed through rotation of the bent sub, and the rotation is effected by the tool which is positioned between the lower end of the drill string and the bent sub. In known tools the rotation cannot be infinitely variable, but has to be done in invariable angular turns in the range of 15-20 degrees. This means that the drilling direction cannot be changed with the desirable accuracy. Another drawback of known tools is that the admission of the drill bit will have to be reduced to allow rotation of the bent sub. The consequence of this may be that the drill bit loses its grip in the ground formation, so that instead of completing its rotation, the bent sub will return to its initial position. This is a condition which complicates and moreover delays the work of changing the drilling direction.

Summary of the Invention

The main object of the present invention is to provide a whereby the rotation of the bent sub may be carried out in an infinitely variable manner. Other objects are that the rotation should

202050 ETHEOT


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take place by full admission of the drill bit, and the rotation should take place at a speed which allows the measuring equipment to provide measurement results which are in accordance with the actual rotation. Thereby the drilling direction could be changed without the drawbacks mentioned above. Moreover, the tool will be somewhat easier to operate and provide greater precision during rotation than what has been normal. This has been realized through the present adapted for changing the drilling direction during drilling. The drilling equipment used in the drilling, preferably comprises a drill string, such as coiled tubing, a bent sub, drill motor and drill bit. Further the tool is positioned between the drill string and the bent sub, comprises housing elements connected to one another, has a passage for, among other things, fluid such as drilling fluid, and may be activated for rotation of the bent sub, so that the direction of drilling is changed. The particular about the invention is that the tool is provided with means, which are adapted so that the rotation can be infinitely variable. The means are provided in the through passage of the tool, and comprises a valve arranged to choke the passage, so that the tool can be activated for the rotation, a piston adapted for providing the rotation after the through passage has been choked, and sets of cooperating guides adapted for forced guiding of the rotation. The guides are formed in the wall of the through passage, or in the opposite wall for the piston. Other details of the invention will appear from the dependent Claims and the following part of the specification.

Brief Description of the Drawings

Referring to the appended set of figures, a preferred, but non-limiting embodiment of the invention will be explained,

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Detailed Description of the Preferred Embodiment

In Figs. 2-4 the tool has been divided into two sections for reason of exposition, and the reference numerals have been distributed among the figures, so that the reference numerals of one figure refer to the same details in the other figures.

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